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(FOUO 2/79)

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This serial publication contains abstracts of articles published in selected scientific and technical journals. JPRS is unable to honor requests for original source materials or information as to the availability of full translations of these articles.

CONTENTS PAGE

AERONAUTICAL KNOWLEDGE

AUTHOR: REN Xinmin [0117 2450 3046]

ORG: None

TITLE: "Impressions on Japanese Space Technology"

SOURCE: Beijing HANGKONG ZHISHI [AERONAUTICAL KNOWLEDGE] in Chinese No 2, Feb 79 pp 4-5

ABSTRACT: From his visits to the Tokyo Cosmic Science Exhibition and to several research organizations and space-related companies, the author summarizes his impressions on the development of space technology in Japan: 1) specialization in the development of solid propellant rockets; 2) efforts to study old techniques while developing new techniques for space exploration; 3) emphasis on basic research in space science; 4) special efforts to introduce foreign space technologies and to encourage international cooperation; and 5) emphasis on improving quality control and working environment.

AUTHOR: CHENG Bushi [4453 0008 2514]

ORG: None

TITLE: "Creative Thinking in Engineering Design"

SOURCE: Beijing HANGKONG ZHISHI [AERONAUTICAL KNOWLEDGE] in Chinese No 2, Feb 79 pp 6-8

ABSTRACT: In this article, the subject of creative thinking is discussed in a speech given by Comrade WEI Ke [5898 0668], who is the deputy chief designer of a certain airplane factory. Specifically, he talked about current research efforts to understand the human thought process and the application of computers to simulate human intelligence and brain functions. A number of examples are presented to illustrate the power of creative thinking to solve engineering design problems and day-to-day problems. The distinction between judgemental thinking and creative thinking is also explained (to be continued).

AUTHOR: YANG Da zhuo [2799 1129 3504]

ORG: None

TITLE: "The Future Aviation Fuel -- Liquid Hydrogen"

SOURCE: Beijing HANGKONG ZHISHI [AERONAUTICAL KNOWLEDGE] in Chinese No 2, Feb 79 pp 8-9

ABSTRACT: Liquid hydrogen is a potential new energy source for future supersonic airplanes. Currently, there are several techniques for extracting liquid hydrogen from petroleum or from water. The desirable properties of liquid hydrogen are its high energy content, its low freezing point, and its non-polluting by-product of combustion. However, liquid hydrogen requires very large and well insulated storage tanks; it can also from a highly explosive gas if allowed to evaporate into the air. A conceptual design of future hypersonic airplanes has two propulsion systems: one using a conventional gas turbine engine for low speed operation ($M < 3.5$) and the other using a liquid hydrogen continuous ram jet for high speed operation.

AUTHOR: ZHU Yilin [2612 3015 7792]

ORG: None

TITLE: "The 'Voyagers' Touring the Outer Planets"

SOURCE: Beijing HANGKONG ZHISHI [AERONAUTICAL KNOWLEDGE] in Chinese No 2, Feb 79 pp 12-15

ABSTRACT: During August and September of 1977, the United States launched two spacecraft , Voyagers I and II, to explore the outer planets of the solar system. The main objective of the Voyager expedition is to collect data on planets Jupiter and Saturn with the hope of gathering clues relating to the formation of the solar system and to the origin of earth. The Voyagers carry three types of instruments: photographic equipment, equipment for analyzing the interplanetary environment, and receivers and antennas for conducting radioactivity experiments. The Voyagers follow a "relay trajectory" by taking advantage of Jupiter's strong gravitational forces to minimize the traveling time to Saturn and to Uranus. The Voyagers are also carrying a record which contains information on the natural environment, the civilization, and languages and music from earth.

AUTHOR: None

ORG: Jining District Model Airplane Team

TITLE: "Automatic Parachute Opening and Releasing Devices"

SOURCE: Beijing HANGKONG ZHISHI [AERONAUTICAL KNOWLEDGE] in Chinese No 2, Feb 79 pp 15-16

ABSTRACT: The "Gai Yi" model airplane which has been widely used by the Armed Services for anti-aircraft target practices can be retrieved by parachute. In this article, two devices are introduced which have been designed to open the parachute automatically in case of radio failure and to release the parachute automatically once the model airplane hits the ground. The chute opening device consists of an electric circuit which is activated when abnormal voltage in the transmitter or receiver is detected. The chute releasing device consists of a mechanism which is operated by the impact force when the model airplane hits the ground. Both the manufacturing and operating procedures of the devices are described.

AUTHOR: None

ORG: None

TITLE: "The Simulator That Travels to the Moon"

SOURCE: Beijing HANGKONG ZHISHI [AERONAUTICAL KNOWLEDGE] in Chinese No 2, Feb 79 p 17

ABSTRACT: The space and rocket center of Huntsville, Alabama has a lunar spaceship simulator which allows the tourists to experience a journey to the moon. The simulator can accomodate 45 passengers at one time. After "take-off", the passengers may experience up to 2 g acceleration and the feeling of weight reduction. At the same time, they see scenaries of earth departure which are projected by a movie projector onto an overhead screen. The entire journey takes 10 minutes.

AUTHOR: LIU Zhen [0491 4176]

ORG: None

TITLE: "The MIRAGE 2000"

SOURCE: Beijing HANGKONG ZHISHI [AERONAUTICAL KNOWLEDGE] in Chinese No 2,Feb 79 pp 18-19

ABSTRACT: In 1978, France introduced a new supersonic airplane fighter airplane, the "Mirage 2000", which has been designed on the basis of its predecessor, the "Mirage III". Its important features are as follows: 1) tail-less triangular wing design; 2) propelled by a M53 turbo-fan engine with 9-ton thrust; 3) maximum speed - Mach 2.3; 4) combat ceiling - 20 km, combat radius - 700 km; 5) electrically operated control; 6) automatic stabilization system; and 7) the use of leading edge flap to improve maneuverability. It is equipped with two 30 mm guns, two air-to-air missiles, and two close range combat missiles.

AUTHOR: YI Ding [0001 0002]

ORG: None

TITLE: "Pattern Recognition"

SOURCE: Beijing HANGKONG ZHISHI [AERONAUTICAL KNOWLEDGE] in Chinese No 2, Feb 79 pp 20-21

ABSTRACT: Pattern recognition is a new branch of science which is designed to extract information from large amounts of noise corrupted data. It has a wide range of practical application such as mail sorting, automatic diagnosis, and automatic translation, etc. The procedures of pattern recognition consist of two basic steps: feature extraction and classification. In this article, the procedures are illustrated using two examples: 1) recognizing the images of six different types of airplanes, the F-4, the Mirage III, the MIG-21, the F-105, the F-104 and the B-57; 2) recognizing major arteries from a satellite picture.

AUTHOR: MA Junru [7456 0193 1172]

ORG: None

TITLE: "The Amazing Silicon Chip"

SOURCE: Beijing HANGKONG ZHISHI [AERONAUTICAL KNOWLEDGE] in Chinese No 2,Feb 79 pp 21-13

ABSTRACT: Over the past few decades, major advances in integrated circuit technology were made that resulted in drastic reductions in the size of computer components. At present, silicon chips can be built which contain thousands of transistors, resistors and capacitors. In this article, a historical account of the miniaturization of semiconductors and large scale integrated circuits is presented. The manufacturing techniques of integrated circuits and the importance of quality control in manufacturing process are discussed. Specifically, the major factors which affect quality control are described in detail. They are: 1) defective silicon material; 2) damages caused by careless manufacturing process; 3) contamination due to dust particles; 4) contamination due to sodium ion pollutants; 5) manual versus computerized circuit design; and 6) simplification of circuit components.

AUTHOR: ZHOU Yenru [0719 1750 0320]

ORG: None

TITLE: "Infrared Scan Detection Techniques"

SOURCE: Beijing HANGKONG ZHISHI [AERONAUTICAL KNOWLEDGE] in Chinese No 2,Feb 79 pp 24-25

ABSTRACT: This article presents a tutorial discussion of infrared detection techniques. In particular, the basic principle of image formation by infrared scanning is described. The distinctions between infrared images and visible images are explained and the desirable features of infrared pictures are pointed out. Applications of infrared scanning techniques on satellites and airplanes are also discussed, which include military reconnaissance, collection of data on weather and earth resources, monitoring crops and forest fires, collection of data on hydrology and oceanography, construction of geological maps, and searching for geothermal energy sources.

AUTHOR: None

ORG: None

TITLE: "Panel Discussion on Single Passenger Flying Vehicles"

SOURCE: Beijing HANGKONG ZHISHI [AERONAUTICAL KNOWLEDGE] in Chinese No 2, Feb 79 pp 28-29

ABSTRACT: On 14 November 1978, the editorial office of HANGKONG ZHISHI sponsored a panel discussion on single passenger flying vehicles. The panelists were XU Xizhuan [6079 6932 4957], CHENG Bushi [4453 0008 2514], WANG Qinian [3076 5075 1628], LIU Yi [0491 5065] and ZHANG Taichang [1728 1132 2490]. The topics covered in the discussion include: 1) review of previous research and development work on single passenger vehicles in China; 2) survey of various designs of single passenger flying vehicles in foreign countries; and 3) difficult technical problems and future trend of development in single passenger flying vehicles.

AUTHOR: HUI Min [1920 3046]

ORG: None

TITLE: "'Grand Slam' and 'Department Store'"

SOURCE: Beijing HANGKONG ZHISHI [AERONAUTICAL KNOWLEDGE] in Chinese No 2, Feb 79 pp 30-31

ABSTRACT: This is a story of heavy weight aerial bombs. The "Department Store" was a 4.2 ton bomb designed by the British to destroy German dams and dikes during World War II. The "Grand Slam" was a 10-ton earthquake bomb which was successfully used by the British against German bridges. The United States dropped two atomic bombs on Japan during the war, which weighed 4.5 tons and 4.1 tons respectively. After the war, the United States tested the 20-ton model T12 bombs which were the heaviest bombs ever built.

AUTHOR: FANG Qing [2397 2532]

ORG: None

TITLE: "Soviet Union's Space Shuttle"

SOURCE: Beijing HANGKONG ZHISHI [AERONAUTICAL KNOWLEDGE] in Chinese No 2, Feb 79 p 32

ABSTRACT: For more than a year, the Soviet Union reportedly has been developing its space shuttle program at a secret military base. There is evidence that it has developed a triangular-wing space shuttle vehicle which had been flight-tested in the atmosphere using the TU-95 bomber as a carrier, but had not been flight-tested in orbit. This vehicle is estimated to be smaller than the 67.5 ton U.S. space shuttle but can perform essentially the same functions. The type of booster used to launch the vehicle is a topic of current analysis and speculation.

AUTHOR: LIU Wenzhang [0491 2429 4545]

ORG: None

TITLE: "The National Youth Scientific Achievement Exhibition"

SOURCE: Beijing HANGKONG ZHISHI [AERONAUTICAL KNOWLEDGE] in Chinese No 2, Feb 79 p 32

ABSTRACT: A National Youth Scientific Achievement Exhibition will be held in October of 1979 under the sponsorship of the National Science Association, the Department of Education, and the National Athletic Committee. Included in the exhibition will be more than 5000 items which are created by middle school or elementary school students from all over the country. The contents of the exhibition will cover a wide range of basic sciences such as mathematics, physics, chemistry, astronomy, geography, and biology as well as models, photographs and technical reports related to the military science. The exhibition is expected to extend for a period of two months.

AUTHOR: None

ORG: None

TITLE: "Pictorial Illustrations"

SOURCE: Beijing HANGKONG ZHISHI [AERONAUTICAL KNOWLEDGE] in Chinese No 2,Feb 79 front and back covers

ABSTRACT: The front cover of this issue shows photographs of the Chinese-made attack airplanes. The back cover shows photographs of the French third-generation supersonic fighter airplane "MIRAGE 2000", and the "MIRAGE III" airplane which was built in the 1950's.

AUTHOR: QUAN Hong-sheng [0356 1347 5116]

ORG: None

TITLE: "The Amazing Memory Alloy"

SOURCE: Beijing HANGKONG ZHISHI [AERONAUTICAL KNOWLEDGE] in Chinese No 3, Mar 79 pp 4-6

ABSTRACT: Certain alloys have been found to possess the property of memorizing their original shape even when they have been subject to considerable deformation. This property is due to a phenomenon called martensite transformation which re-arranges the atomic and molecular structures of alloys under changing temperature conditions. The memory alloy also has the property called superelasticity which allows the alloy to be compressed and return to its original shape like rubber. Currently , these alloys are being used on pipe joints, rivets, electric generators, integrated circuits, and in many other industrial and medical applications.

AUTHOR: QI Xin [4359 2946]

ORG: None

TITLE: "Integration of Airplane Design and Manufacturing"

SOURCE: Beijing HANGKONG ZHISHI [AERONAUTICAL KNOWLEDGE] in Chinese No 3, Mar 79 pp 7-9

ABSTRACT: In the design and manufacturing of modern aircraft, computers are used to perform a variety of complicated tsks such as scientific testing, engineering design, production technology, and production management. By systematically connecting these computer functions, it is possible to establish an integrated system for design and manufacturing. In this article, several topics related to integrated systems are discussed: 1) the design of computers to solve various problems in system engineering; 2) the representation of airplane profiles by mathematical models in the computer; and 3) the actual development of integrated systems of airplane design and manufacturing at the Boeing Company and the Lockheed Aircraft Company in the United States.

AUTHOR: CHENG Wen [2052 2429]

ORG: None

TITLE: "Tail-less Triangular Wing Airplane"

SOURCE: Beijing HANGKONG ZHISHI [AERONAUTICAL KNOWLEDGE] in Chinese No 3, Mar 79 pp 10-11

ABSTRACT: A tail-less airplane is one that combines the horizontal stabilizer with its main wing to reduce weight and to minimize aerodynamic drag. The first tail-less triangular wing airplane, the XF-92, was built in the United States after the Second World War. Subsequently, the U.S., Britain, and France all have developed triangular wing fighters, bombers, and passenger airplane such as the F-102, F-106, YF-12, MIRAGE-III, MIRAGE-2000, B-58, Fire God, and the Concord. Triangular wing airplane has the following advantages: 1) stable flight characteristics at transonic speeds; 2) lower aerodynamic drag at supersonic speeds; 3) light weight and high rigidity. However, it also has certain disadvantages: 1) higher drag at subsonic speeds; 2) loss of lift during pitch-up maneuvers; and 3) longer runway for take-off and landing.

AUTHOR: LIU Zunquan [0491 1415 0356]

ORG: None

TITLE: "Robots"

SOURCE: Beijing HANGKONG ZHISHI [AERONAUTICAL KNOWLEDGE] in Chinese No 3, Mar 79 pp 12-13

ABSTRACT: One of the important developments in computer science and computer technology is the simulation of human functions and human intelligence by machines. In this article, the use of robots in deep sea retrieval operations, space explorations, assembly of machines, and management of warehouse are introduced. The controversial topic of whether machines can perform independent thinking and attain intelligence equivalent to or superior than human intelligence is discussed. In addition, the basic concept of artificial intelligence is illustrated by the design of "chess-playing programs" on a computer.

AUTHOR: SHU Wen [5289 2429]

ORG: None

TITLE: "Lunar Scientific Monitoring Stations"

SOURCE: Beijing HANGKONG ZHISHI [AERNAUTICAL KNOWLEDGE] in Chinese No 3, Mar 79 pp 14-15

ABSTRACT: Five scientific monitoring stations have been established on the lunar surface since the Apollo 12 mission. Each station consists of the following instruments: 1) thermal ion detectors to measure the energy level and quantity of positive ions generated by solar wind and ultra-violet radiation; 2) mass spectrometers to measure the energy spectrum of ionized particles; 3) magnetometers to measure the response of the moon under the actions of magnetic fields of the Sun and Earth; and 4) lunar seismometers to measure vibrations of the lunar surface. These monitoring stations are powered by radioactive isotope thermal electric generators.

AUTHORS: WANG Jieping [3769 0094 0988]
ZHENG Yuefeng [6774 1471 1496]

ORG: None

TITLE: "The A-21S and A-21SJ Glider Airplanes"

SOURCE: Beijing HANGKONG ZHISHI [AERNAUTICAL KNOWLEDGE] in Chinese No 3, No 3, Mar 79 pp 15-16

ABSTRACT: This article describes the construction and performance of two Italian glider airplanes, the A-21S, and its powered model the A-21SJ. Specifically, the flight performance data of the two gliders are presented as follows:

Performance	Units	A-21S	A-21SJ
empty weight	kg	436	528
payload	kg	208	280
max. take-off weight	kg	644	808
max. wing loading	kg/m^2	39.8	49.9
min. wing loading	kg/m^2	32.0	37.7

[Continuation of HANGKONG ZHISHI No 3, Mar 79 pp 15-16]

max. lift to drag ratio		43	43
advantageous velocity	km/hr	105	120
min. rate of descent	m/sec	0.60	0.68
efficient velocity	km/hr	80	95
stall velocity (flap retracted)	km/hr	70	70
stall velocity (flap extended)	km/hr	63	63
max. towing velocity	km/hr	140	
max. velocity	km/hr	252	252
cruising velocity	km/hr		200
rate of climb	m/sec		4
range	km		350
ceiling	m		11000
take-off distance	m		300

AUTHOR: CUI Dengyuan [1508 4098 0337]

ORG: None

TITLE: "The 'Flying Horse' Engine"

SOURCE: Beijing HANGKONG ZHISHI [AERONAUTICAL KNOWLEDGE] in Chinese No 3, Mar 79 pp 17-20

ABSTRACT: This article introduces the "Flying Horse" engine which is used on the British "Harriet" vertical and short take-off and landing fighter airplane. In particular, the design requirements, the initial design plan, and the engineering evolution of the design since 1954 are described. The special features of the engine which include the four swivel jet nozzles and the jet reaction control system are discussed. In conclusion, the main advantages of the "Flying Horse" engine are summarized.

AUTHOR: None

ORG: None

TITLE: "Pictorial Illustrations"

SOURCE: Beijing HANGKONG ZHISHI [AERONAUTICAL KNOWLEDGE] in Chinese No 3, Mar 79 front covers, back covers, and inserts

ABSTRACT: The front cover of this issue shows a photograph of the night scene of a rocket launch site. The inside front cover and inserts 1 and 4 are excerpts from a translated comic strip book by S. T. Butler and R. Raymond on the following topics: Velocity of Light and Space Travel; Einstein's Theory of Relativity. Inserts 2 and 3 show schematic diagrams of the "Flying Horse" engine which is used on the British "Harriet" vertical and short take-off and landing fighter airplane. The inside back cover shows pictures of a number of tail-less triangular wing airplanes built by the United States, Britain, France, Germany, and Sweden. The back cover of this issue shows schematic diagrams and photographs of two Italian glider airplanes: the A-21S and the A-21SJ.

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